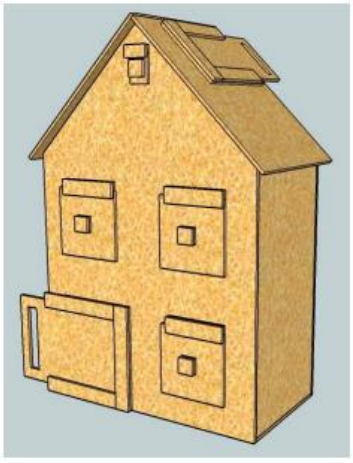
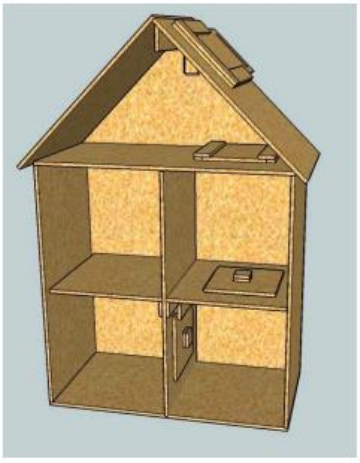
FireFlex FR House Wrap Model Demonstration
February 21st, 2022

1. **House Model Demonstration Purpose:**
    a. To show differences in <u>flow path</u>, <u>heat distribution</u>, and <u>fire behavior</u> between a house model with FireFlex FR House Wrap barrier & a house model without any barrier
    b. To show the differences in <u>structural integrity</u> after exposure to simulated heavy fire conditions
2. **House Model Design**:
    a. <u>Materials:</u>
        i. (4) 4'x8' 7/16" OSB
        ii. ¼" Heavy Duty Craftsman Staples
            1. To mechanically fasten FireFlex FR House Wrap to OSB
        iii. 1" Brad Nails
            1. To fasten the OSB sheets together
        iv. FireFlex FR House Wrap
        v. FireFlex FR House Wrap Adhesive
    b. <u>Building Design</u>:

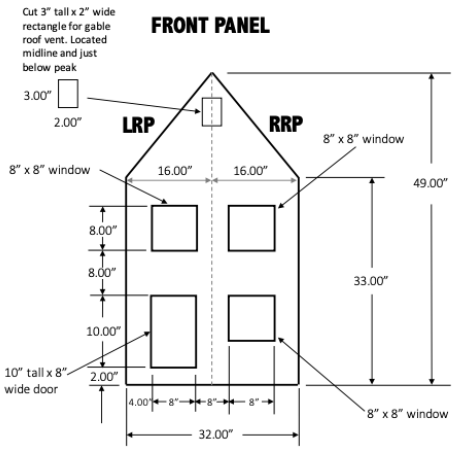


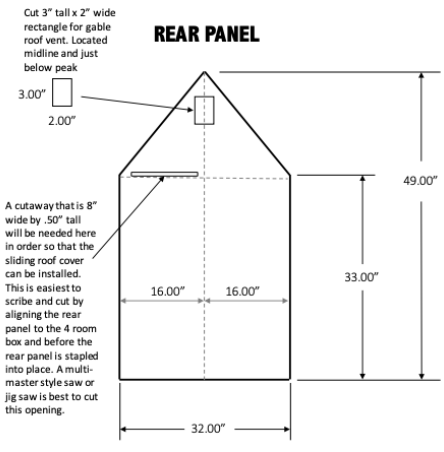
Front View



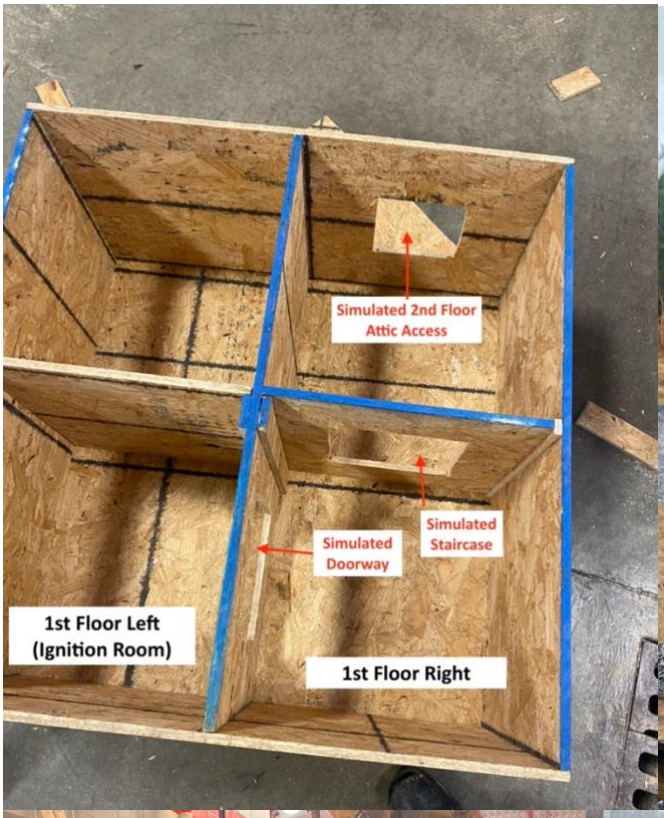
Interior View

Rear View





1. **House Model Design (Continued)**



FireFlex FR House Wrap Adhesive applied to all areas where seams of the material overlapped and along the joints in both 1st floor rooms

(Smoke is from remains of the unwrapped house smoldering out of frame post-demonstration)

2. **Demonstration**
    a. Unwrapped House
        i. Fire Load was put in the 1st Floor Left Room (**IGNITION ROOM**)
            1. Strips of OSB
            2. Strips of Cardboard
            3. Strips of Polyester/Cotton Blend Synthetic Material
        ii. Training Personnel utilized the window & door covers to manipulate the air flow to mimic the different fuel/fire/heat/smoke conditions experienced in a house fire
        iii. Once fire with a steady burn rate was established, the off-gassing of the structural OSB became the fuel for the fire — Addition to Fire Load Unnecessary to Maintain Steady Burn Rate
    b. Wrapped House
        i. Fire Load was put in the 1st Floor Left Room (**IGNITION ROOM**)
            1. Strips of OSB
            2. Strips of Cardboard
            3. Strips of Polyester/Cotton Blend Synthetic Material
        ii. Training Personnel utilized the window & door covers to manipulate the air flow to mimic the different fuel/fire/heat/smoke conditions experienced in a house fire
        iii. Once fire with a steady burn rate was established, the off-gassing of the structural OSB was severely inhibited — Addition to Fire Load Necessary to Maintain Steady Burn Rate
3. **Observations**
    a. Unwrapped House:
        i. Clock started at time of confirmed fire ignition; clock stopped at time house was declared a "Total Loss" i.e. when compromises in overall structural integrity of the house reached an unsalvageable point
            1. **Total Time** – 0 h 22 m 35 s
        ii. At 0 h 5 m 17 s conditions inside the two 1st floor rooms reached **IDLH Conditions** (Immediately Dangerous to Life and Health)
            1. NIOSH defines the condition as an incident "*that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment*."

iii. At 0 h 8 m 49 s the two 1st floor rooms experienced **Flashover Conditions** and the two 2nd floor rooms experienced IDLH Conditions

1. NFPA 921 defines flashover as "*A transitional phase in the development of a compartment fire in which surfaces exposed to thermal radiation reach its ignition temperature more or less simultaneously and fire spreads rapidly throughout the space resulting in total involvement of the compartment(s)*"

iv. At 0 h 13 m 27 s the two 2nd floor rooms experienced Flashover Conditions

v. At 0 h 22 m 35 s structure was declared a **Total Loss**

b. Wrapped House:
   i. Clock started at time of confirmed fire ignition; clocked stopped after fire self-extinguished
      1. **Total Time** – 0 h 31 m 57 s
   ii. At 0 h 9 m 33 s conditions in the **ignition room** on the 1st floor room reached IDLH conditions

   iii. At 0 h 14 m 32 s difference in temperature between the two 1st floor rooms was observed to be **676° F**; the difference in temperature between the interior and exterior of the **ignition room** was **748° F**

iv. At 0 h 18 m 51 s the 1st floor right room experienced IDLH Conditions

v. At 0 h 21 m 38 s the 1st floor right room experienced Flashover Conditions

vi. At 0 h 22 m 52 s the 2nd floor right room experienced IDLH conditions

vii. At 0 h 26 m 47 s the majority of the fire was determined to be out due to covering the openings, no fire extension into the second floor or attic space was observed

1. Water was sprayed on the covers to prevent complete burn-through

viii. At 0 h 31 m 33 s the fire was determined to be out completely

4. **Conclusion**:
   a. Throughout the demonstration, the FireFlex FR House Wrap product exhibited exceptional inhibition of fire growth into other areas of the structure, OSB off-gassing, heat distribution, and smoke production
   b. The fire in the wrapped house had to be continuously fed additional fuel to subject the structure and material to a consistent burn rate
      i. The implication is that the fire would have smothered itself into extinguishment had additional fuel not been added to the ignition room
   c. Structural integrity was not affected (see **Section 6**)

5. **Special Notes**:
    a. The wrapped house experienced a failure in the ignition room, where a portion of the material had been fastened with only the material's adhesive on the ceiling – Installation Error
    b. Approx. 20mL of water was sprayed on both houses in order keep the window and door cover integrity

6. **Post-Demonstration Photos**

Ignition Room

1st Floor Right Room

2nd Floor Right Room

2nd Floor Left Room

Attic Space